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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,905	03/12/2004	Thomas J. O'Keefe	31550-1001	8305
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EXAMINER				
LEADER, WILLIAM T				
ART UNIT		PAPER NUMBER		
1795				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/799,905

Applicant(s)

O'KEEFE ET AL.

Examiner

WILLIAM T. LEADER

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 December 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-5,9-11,13-19,27,44,48-51 and 53-59 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-5,9-11,13-19,27,44,48-51 and 53-59 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsman's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. Receipt of the papers filed on December 5, 2008, is acknowledged.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
3. The amendments have overcome a number of the issues raised in the previous office action under 35 U.S.C. 112, first and second paragraphs. However, additional issues remain as set forth below.

Claim Rejections - 35 USC § 112

4. Claim 53 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.
5. Newly presented claim 53 recites that the barrier layer comprises a metal combination or a non-metal combination. Basis for this limitation in the specification as filed is not apparent.
6. Claims 50, 57 and 59 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not

described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

7. Claim 50 recites the step of removing a barrier layer. Basis for this limitation in the specification is not apparent. Page 12, lines 1-3 of the specification indicate that a surface coating such as oxides of a barrier layer may be removed, but this portion of the specification does not appear to provide basis for the step of claim 50 as worded. This removal of a *surface coating* appears to be different than the removal a *barrier layer*. Barrier layers are described at page 16, lines 15-24.

8. Newly presented claim 57 recites that the deposition component comprises a metal compound, while newly presented claim 59 recites that the desired deposition component comprises an organometallic complex. It is noted that claim 4 previously recited a metal compound and an organometallic complex as part of a Markush Group. New claims 57 and 59 are the first recitation of these limitations independently. As described at page 7, lines 6-7 of the specification, the process includes depositing the desired component from the organic solution onto the substrate by reducing a cation of the desired deposition component. Page 10, lines 12-15 state that the present invention comprises a process utilizing electrochemical displacement or displacement coating mechanisms wherein a metal ion is completely or partially reduced on a substrate. The mechanism of the electrochemical reaction is given in more detail at page 14, line 22 to page 15, line 8. All of the cited portions of applicant's specification pertain to the partial reduction or complete reduction and deposition of a cation from the organic solution as a metal onto the substrate. All of the operative examples at pages 18-25 show the deposition

of a single metal or two metals as an alloy on the substrate. Applicant has not enabled the deposition of a metal compound or an organometallic complex.

9. Claims 49 and 53 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 49 the phrase "most preferably" renders the claim indefinite. It is noted that at page 9 of the Remarks, applicant states that claim 49 has been amended. However, the copy of claim 49 received in the papers filed on December 5, 2008, remains unchanged. In claim 53, the scope of "metal combinations" and "non-metal combinations" is not clear.

Claim Rejections - 35 USC § 102

10. Claims 1, 3-5, 9, 10, 13-18, 48-51, 53, 55, 56 and 58 are rejected under 35 U.S.C. 102(a) as being anticipated by the paper "Pd-Cu Co-deposition on TiSiN as seeds for electroless plating" by Jingye Li for the reasons given in the previous office action and in view of the following comments.

11. Newly presented claim 53 recites that the barrier layer may comprise a metal nitride. Li discloses a TiSiN barrier layer. See section 1 "Introduction". With respect to new claim 55, Li discloses that Pd and Cu ions were loaded into an organic solution. The Pd and Cu each constitute a desired deposition component that is more noble than the less noble TiSiN barrier layer. The workpiece was contacted with the solution. See section 2 "Experimental." With

respect to new claim 56, Cu was deposited, and Pd and Cu were co-deposited. With respect to new claim 58, Cu and Pd would have been reduced as cations.

12. Claims 1, 3-5, 9-11, 14, 18, 19, 27, 39, 42, 44, 48, 50, 51, 53, 55 and 58 are rejected under 35 U.S.C. 102(b) as being anticipated by the Fang et al article "An Alternative Metallic Seeding Technique for Subsequent Electrochemical Deposition of Copper onto Barrier Metals" for the reasons given in the previous office action and in view of the following comments.

13. With respect to new claim 53, Fang et al discloses deposition onto Ti(N) and Ta(N). See the abstract. With respect to new claim 55, Fang et al show an example of loading the organic solution with the deposition component such as Cu in equation (1) on page 138. The deposition component was then removed from the organic solution using a metal as reducing agent (page 138). With respect to claim 58, the Cu would have been reduced as cations.

Claim Rejections - 35 USC § 103

14. Claims 13 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Fang et al article "An Alternative Metallic Seeding Technique for Subsequent Electrochemical Deposition of Copper onto Barrier Metals".

15. As indicated in the previous office action, claim 13 recites the organic solution comprises at least two deposition components. Newly presented claim 56 recites that the desired deposition component comprises a metal alloy. As previously indicated, Fang et al disclose the deposition of Cu or Pd from an organic solution by immersion plating. In the table of page 140, Fang et al

show the open-circuit potential of metals in various organic solvents. As shown, Ag and Cu have similar potentials. Deposition of more than one metal such as Ag and Cu would have been obvious because properties of both would have been obtained.

16. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over the paper "Pd-Cu Co-deposition on TiSiN as seeds for electroless plating" by Jingye Li for the reasons given in the previous office action.

17. Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over either the paper "Pd-Cu Co-deposition on TiSiN as seeds for electroless plating" by Jingye Li or over the Fang et al article "An Alternative Metallic Seeding Technique for Subsequent Electrochemical Deposition of Copper onto Barrier Metals" in view of O'Keefe (US 5,228,903).

18. Claim 54 recites reacting a loaded organic solution, a metal, and an aqueous stripping phase; settling; and separating the metal and stripping phase. This sequence is described at page 16, lines 5-8 of the specification where is noted that "In simultaneous galvanic coating, the loaded organic, the solid metal reductant and an aqueous stripping phase are allowed to react before settling and separating. This arrangement seems more efficient for partial reduction separation, for example reducing Fe^{3+} to Fe^{2+} or Ce^{4+} to Ce^{3+} that then easily transfer into the aqueous stripping phase."

19. The O'Keefe patent is directed to galvanic stripping of a metal from an organic solution loaded with the metal. O'Keefe describes the equations at column 5 as showing the partial

reduction of the M_1 ions by solid metal $M_{2(s)}$ to a lower oxidation state and allowing easier stripping into an aqueous phase (column 5, lines 19-56). It would have been obvious at the time the invention was made to have utilized the procedure disclosed by O'Keefe in the process of Li or Fang et al because it would have facilitated separation of secondary metal ions from a desired primary metal ion in the organic solution.

Response to Arguments

20. Applicant's arguments filed December 5, 2008, have been fully considered but they are not persuasive. At pages 9 of the Remarks, applicant states that the Li document was never published. However, it is not clear whether the document was available to others. As explained in MPEP section 2128 a reference is a "printed publication" if it is accessible to the public.

21. At page 10 of the Remarks, applicant argues that nowhere does Fang teach a galvanic coating method. This argument is not convincing. Fang discloses the same process steps as those recited by applicant. At page 14 of applicant's specification, applicant describes a generic cementation reaction in an organic solution as involving using a less noble metal to serve as a reducing agent for a more noble cation and provides an equation. At page 138 Fang et al describe cementation reactions, and at page 139 provide an equation for the deposition of copper using aluminum as the anode or reducing agent. The formula is of the same form as that of applicant. In example E on pages 22 and 23 of applicant specification, applicant discloses the same deposition of copper from an organic solution onto an aluminum substrate using the aluminum as the reducing agent.

Conclusion

22. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM T. LEADER whose telephone number is (571) 272-1245. The examiner can normally be reached on Mondays-Thursdays and alternate Fridays, 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/William Leader/
March 13, 2009

/PATRICK RYAN/
Supervisory Patent Examiner, Art Unit 1795